LIBRARY
FISH & WILDLIFE SERVICE
PACIFIC OCEANIC FISHERY
INVESTIGATIONS

VOLUME VI OCTOBER-DECEMBER, 1931 No. 4

JOURNAL

OF THE

Pan-Pacific Research Institution

A Periodical Record of Investigations Bearing on Problems of Food Production, Distribution, Conservation and Consumption, as well as on Public Health, and Race and Population Problems as Related to the Countries Bordering on the Pacific.

INDEX

A MEMORIAL TO DR. ARTHUR STARR EAKLE - 2

A CHECK LIST OF FISHES FROM THE SOLOMON ISLANDS - - - - - - - 4

A LIST OF FISHES COLLECTED AT MOOREA, ONE OF THE SOCIETY ISLANDS, BEING THE FIRST RECORD FROM THIS ISLAND - - - - - 10

A CHECK LIST OF THE FISHES RECORDED FROM THE NEW HEBRIDES - - - - - 11
By Albert W. Herre, Stanford University, California

LABORATORY OF AGRICULTURAL CHEMISTRY OF THE CHINESE EASTERN RAILWAY - - - 14

THE CANAL ZONE EXPERIMENTAL GARDENS - 16

AT PRESENT PUBLISHED QUARTERLY AT HONOLULU, HAWAII
BY THE
PAN-PACIFIC UNION

More frequent publication as acceptable material is contributed.

Memorial to Dr. Arthur Starr Eakle

By Harold T. Stearns

Being such a congenial, affable, lovable man, a single year's residence in Honolulu was sufficient for Dr. Eakle to form innumerable friends who now mourn his loss as friend and distinguished scientist. Dr. Eakle's friendly smile will not soon be forgotten. His ability to popularize his lifelong study—mineralogy—made him a welcome speaker. He addressed the Engineering Society, the Chemical Society, and the Pan-Pacific Union in Honolulu on several occasions, and, regardless of the topic, his lectures were always well received. On several occasions he served as chairman of the Pan-Pacific Friday night science programs and took an active part in all round-table discussions.

Born in Washington, D. C., on July 27, 1862, the son of Elias H. Eakle and Mary Frances Byington, he acquired many southern graces and throughout his life he retained some of the southern dialect learned in childhood. After completing his preparatory education Dr. Eakle worked in the U. S. Printing Office, but when twenty-six years old he decided to be an engineer and entered Cornell University.

While preparing for engineering he was won over to mineralogy and after being awarded a Bachelor of Science degree in 1892 he accepted an appointment as instructor in mineralogy at his Alma Mater. After remaining in this position for four years he departed for Germany to do advanced work in mineralogy. This study culminated in the degree of Doctor of Philosophy at Munich in 1896. Dr. Eakle loved to tell of his European experiences and of his associations with his European professors and his American co-students. Among these students were Dr. Thomas A. Jaggar, Jr., so well known for his work in volcanology and Dr. Charles Palache, Professor of Mineralogy at Harvard. This early association with Dr. Jaggar led to his appointment later on Jaggar's Bogoslof Expedition to Alaska in 1907. His association with Dr. Palache led to an appointment in 1898 at Harvard University. Correspondence indicates that only a short time before he died Dr. Eakle contributed money to help some of his European scientific friends who had been left penniless by the political disturbances since the war. His generous and sympathetic nature was evident in many other ways.

In 1898 he accepted an appointment as instructor in mineralogy at Harvard and remained there until 1901 when he was called to the University of California, where in 1919, he became full professor and in 1930, Professor Emeritus. During twenty-nine years of teaching in California he made numerous contributions to the science of mineralogy. He had remarkable success as a teacher because he had a way of lessening the burden of the tedious memory work of mineralogy. Among his students are such prominent scientists as Dr. Esper Larsen, Professor of Petrography at Harvard; Dr. Adolph Knopf, Professor of Petrography at Yale; Dr. W. T. Schaller, mineralogist and chemist in the U. S. Geological Survey; and Dr. W. F. Foshag, Curator of Mineralogy, U. S. National Museum.

Upon retirement Dr. Eakle and his wife came to Honolulu for a visit. After a few days of sight-seeing he felt the urge of his profession, and before long became interested in the mineralogy of Oahu. Through the courtesy of Prof. Harold Palmer he was given laboratory space at the University of Hawaii where he worked daily from 9 a. m. to 5 p. m. analyzing minerals and determining their optical properties.

In the basalt at Moiliili quarry he determined nephelite, melilite (?), bronzite, augite, olivine, apatite, and titaniferous

magnetite as primary minerals. Among the secondary minerals present he found phillipsite, chabazite, thompsonite, calcite, aragonite, chalcedony, limonite, hematite, and clay. He identified chalcedony, quartz, aragonite, heulandite, epistilbite, ptilolite, and laumontite among the minerals filling cavities in the lava flows. He found also gypsum, pyrite, chrysocolla, labradorite, garnet, pyrolusite, psilomelane, kaolinite, and montmorillonite on Oahu. Unfortunately he had made few notes, hence little can be salvaged from his year's work on the minerals of Oahu. Had his work not been interrupted by his death, he would have undoubtedly made a notable contribution on a subject hardly touched upon in the Hawaiian Islands. In conversation with the writer, Dr. Eakle often remarked how different was the chemical composition of the minerals of Oahu from that reported in Dana's "Mineralogy." His thirty-eight contributions to the science of mineralogy are listed in Nickle's "Bibliography of the Geologic Literature of North America" published by the U. S. Geological Survey. His most widely quoted works are "Mineral Tables for the Determination of Minerals by Their Physical Properties" and "California Minerals."

For his age Dr. Eakle was a very active man and seemed capable of many years of active work, but in June, 1931. he contracted influenza. It seemed only a mild attack but soon settled in his lungs and on July 5 at 5:30 a. m. he died of pneumonia at the St. Francis Hospital in Honolulu. He is survived by his widow, Fanny V. Kinney, whom he married on August 29, 1899, and a daughter, Mrs. Alice Long, both of whom are now living in Berkeley, California.

Dr. Eakle was a fellow in the Geological Society of America, member of the Mineralogical Society of America (president in 1925), the Washington Academy of Sciences, Sigma Xi, Sigma Gamma Epsilon, and the American Association for the Advancement of Science. In various ways he served his community and the University of California during his long residence in Berkeley, and in reviewing his civic and academic life one finds him acting in such varied capacities as chairman of the Department of Geology, actor in college plays, member of the Hillside Club, and a trustee of a Girl Scouts' fund.

In May, 1931, Dr. and Mrs. Eakle planned to return to their home in Berkeley to attend to various matters, but Dr. Eakle was so fascinated by his work on the minerals of Oahu that he persuaded Mrs. Eakle to return alone for the summer. From May 20 until his death he lived at the writer's home and during this time became endeared to all the family. His lovable personality leaves an indelible impression with us.

(Notes of Dr. Eakle's talk on "Minerals of Oahu" before the Friday evening Pan-Pacific science group appear on page 341 of the October Mid-Pacific Magazine. A recent photograph of Dr. Eakle is published with that article.)

A Check List of Fishes from the Solomon Islands

By Albert W. Herre,
Stanford University, California.

The fish fauna of the Solomon Islands is an extension of that of the East Indies, and is very rich. No intensive collecting has been undertaken there as yet, although various British, Australian, and American collectors have obtained a good many specimens during short stays in the archipelago. Mr. Alvin Seale made extensive collections at Shortland Island about 1903, and the author collected 189 species in the Solomons in 1929, most of them at Tenibuli, Ysabel Island, during a stay of four days at that place. The freshwater fishes of the Solomon Islands are almost unknown and the streams of the large islands should give a rich harvest to the collector.

As far as possible I have indicated the locality from which specimens have been recorded; unfortunately the older authors rarely mentioned any other place than "the Solomons." I obtained specimens at the following localities: Ugii Island; Tulagi; Auki, Malaita Island; Tenibuli, Ysabel Island; Kulambangra Island; Hathorn Sound, New Georgia Island; and Shortland Island. Unfortunately, at most of these places the time allowed for collecting was very, very brief. I have no doubt that at any one of them 700 or 800 species could be collected during a single season.

(All records made from the author's collections are marked by a *.)

Family Orectolobidae.

1. Hemiscyllium ocellatum (Bonnaterre).

Family Carcharinidae.

2. Galeocerdo arcticus (Faber).
3. Carcharinus sorrah (Müller and Henle); Shortland Island.
4. Carcharinus melanopterus (Quoy and Gaimard).

Family Galeorhinidae.

5. Triaenodon obesus (Rüppell).

Family Rhinobatidae.

6. Rhinobatos armatus Bleeker; Bougainville Island.

Family Dasyatidae.

7. Dasyatis kuhlii (Müller and Henle); Ugii Island.
8. Taeniura lymma (Forskål).

Family Myliobatidae.

9. *Aetobatus narinari (Euphrasen); Tenibuli, Ysabel Island.

Family Clupeidae.

10. *Stolephorus delicatulus (Bennett); Hathorn Sound; Tulagi; Shortland Island.
11. Harengula punctata (Rüppell); Shortland Island; Giza.

Family Engraulidae.

12. *Engraulis heterolobus (Rüppell); Tulagi.

Family Anguillidae.

13. Anguilla mauritiana Bennett; fresh water.
14. Anguilla celebesensis Kaup; fresh water.

Family Ophichthyidae.

15. Chlevastes colubrinus (Boddaert).
16. Ophichthys pinguis Günther.

Family Muraenidae.

17. Echidna nebulosa (Ahl); Shortland Island.
18. Echidna polyzona (Richardson); Bougainville Island.
19. Gymnothorax chilospilus Bleeker.
20. Gymnothorax favagineus (Bl. and Schn.)
21. Gymnothorax nubilus (Richardson).
22. Gymnothorax pictus (Ahl); Shortland Island.
24. *Gymnothorax undulatus (Lacépède); *Tenibuli; Ysabel Island.

Family Plotosidae.

25. Plotosus anguillaris (Bloch); Shortland Island.

Family Synodontidae.

26. Saurida gracilis (Quoy and Gaimard); Shortland Island.
27. Trachinocephalus myops (Bl. and Schn.); Shortland Island.

Family Belonidae.

28. Tylosurus choram (Rüppell); Bougainville Island.
29. Tylosurus appendiculata (Klunzinger).

Family Hemiramphidae.

30. *Hemiramphus dussumieri Cuv. and Val.; *Tulagi.

(Note—No. 23 missing in original mss.)

31. * Hemiramphus far (Forskål); * Tenibuli; Shortland Island.
32. Hemiramphus melanurus Cuv. and Val.; Shortland Island.
33. Zenarchopterus brevirostris (Günther); Guadalcanar Island.
34. * Zenarchopterus dispar (Cuv. and Val.); * Auki, fresh water.
35. * Zenarchopterus kampeni Weber; * Hathorn Sound.

Family Exocoetidae.

36. Parexocoetus brachypterus (Richardson).
37. Cypselurus opisthopus (Bleeker); Shortland Island.
38. Cypselurus nigripennis (Cuv. and Val.); Shortland Island.
39. Cypselurus rubescens (Rafinesque).

Family Pleuronectidae.

40. Arnoglossus intermedius (Bleeker); Shortland Island.
41. Platophrys pantherinus (Rüppell); Shortland Island.

Family Soleidae.

42. Aseraggodes melanostictus (Peters); Bougainville Island.
43. Pardachirus pavoninus (Lecépède).

Family Holocentridae.

44. * Holocentrus binotatus Quoy and Gaimard; Shortland Island; * Tenibuli.
45. * Holocentrus caudimaculatus Rüppell; * Tenibuli.
46. * Holocentrus cornutus Bleeker; * Tenibuli.
47. * Holocentrus diadema Lacépède; * Tenibuli.
48. Holocentrus erythraeus Günther.
49. * Holocentrus lacteo-guttatus Cuv. and Val.; * Tenibuli.
50. * Holocentrus laevis Günther; * Tenibuli.
51. * Holocentrus opercularis Cuv. and Val.; * Tenibuli.
52. * Holocentrus sammara (Forskål) Shortland Island; * Tulagi; * Ugii.
53. * Holocentrus spinifer (Forskål); Tenibuli.
54. * Holocentrus unipunctatus Günther; * Auki; * Hathorn Sound; * Tenibuli.
55. * Holocentrus violaceus Bleeker; * Hathorn Sound; * Tenibuli.
56. * Myripristis adustus Bleeker; * Tenibuli.
57. * Myripristis intermedius Günther; * Tenibuli.
58. * Myripristis leiognathus Valenciennes; * Tenibuli.
59. * Myripristis murdjan (Forskål); * Tenibuli; Shortland Island.

Family Syngnathidae.

60. * Micrognathus brevirostris (Rüppell); * Tulagi.

Family Pegasiidae.

61. Parapegasus volitans (Linnaeus); Wilanti, Malaita Island.

Family Fistulariidae.

62. * Fistularia petimba Lacépède; * Tulagi.

Family Centriscidae.

63. Centriscus strigatus (Günther); Howla Island.

Family Atherinidae.

64. * Atherina forskali Rüppell; * Tulagi.
65. Hepsetia lacunosa (Bl. and Schn.); Shortland Island.

Family Mugilidae.

66. Mugil cephalus Linnaeus; Shortland Island.
67. * Liza vaigiensis (Quoy and Gaimard); * Auki, in fresh water; Bougainville Island; Shortland Island.

Family Sphyraenidae.

68. Sphyraena barracuda (Walbaum); * Tenibuli.
69. Sphyraena qenie Klunzinger; Bougainville Island.

Family Polynemidae.

70. Polynemus plebeius (Bonnaterre); Gaudalcanar Island.

Family Scombridae.

71. Scomber kanagurta Rüppell; Bougainville Island.
72. Rastrelliger brachysoma (Bleeker); Shortland Island.
73. * Acanthocybium solandri (Cuv. and Val.); * Tenibuli.

Family Xiphiidae.

74. Xiphias gladius Linnaeus.

Family Coryphaenidae.

75. Coryphaena hippurus Linnaeus.

Family Carangidae.

76. * Scomberoides tol (Cuv. and Val.); * Tulagi.
77. Elegatis bipinnulatus (Quoy and Gaimard); Shortland Island.
78. Trachurops boops (Cuv. and Val.); Shortland Island.
79. Caranx ignobilis (Forskål); Shortland Island.
80. Caranx oblongus Cuv. and Val.; Bougainville Island.
81. Caranx kalla Cuv. and Val.
82. * Caranx sexfasciatus Quoy and Gaimard; * Auki, fresh water.
83. * Caranx stellatus Eydoux and Souleyet; * Hathorn Sound; * Tenibuli; Shortland Island.
84. Alectis ciliaris (Bloch).

Family Leiognathidae.

85. Gazza equulaeformis Rüppell.

Family Apogonidae.

86. * Apogon amboinensis (Bleeker); * Kulambangra, fresh water.
87. * Apogon bandanensis Bleeker; * Tenibuli; * Ugii; Shortland Island.
88. * Apogon compressa Smith and Radcliffe; * Tenibuli; Shortland Island.
89. * Apogon exostigma (Jordan and Seale); * Auki; * Tenibuli.
90. * Apogon frenatus Valenciennes; * Auki; * Tenibuli.

91. * Apogon hartzfeldi Bleeker; * Auki; *Tenibuli.
92. * Apogon hyalosoma Bleeker; * Tenibuli.
93. * Apogon leptacanthus Bleeker; * Tenibuli.
94. * Apogon melas Bleeker; * Tenibuli.
95. * Apogon multitaeniatus Cuv. and Val.; * Auki.
96. * Apogon novemfasciatus Cuv. and Val.; * Tenibuli.
97. * Apogon orbicularis Kuhl and Van Hass.; * Auki; * Hathorn Sound; * Tenibuli.
98. * Apogon rhodopterus Bleeker; * Auki; * Hathorn Sound; * Tenibuli; Shortland Island.
99. * Apogon sangiensis Bleeker; * Auki; *Tenibuli.
100. Apogon sealei Fowler; Shortland Island.
101. * Archamia zosterophora (Bleeker); *Tenibuli.
102. * Cheilodipterus macrodon (Lacépède); * Tenibuli.
103. * Cheilodipterus quinquelineatus Cuv. and Val.; * Auki; * Tenibuli.
104. * Rhabdamia cypselurus Weber; * Tenibuli.

Family Ambassidae.

105. * Ambassis commersoni Bleeker; * Auki.
106. * Ambassis miops Günther; * Kulambangra, fresh water.
107. Priopis buruensis (Bleeker); * Auki, fresh water.

Family Kuhliidae.

108. * Kuhlia marginata (Cuv. and Val.); * Auki, fresh water.
108*a*. * Kuhlia rupestris (Lacépède); * Auki, fresh water.
109. Kuhlia caerulescens Regan.

Family Serranidae.

110. * Plectropomus oligacanthus Bleeker; *Hathorn Sound.
111. * Cephalopholis argus Bl. and Schn.; * Tenibuli; Shortland Island.
112. * Cephalopholis cyanostigma (Cuv. and Val.); * Tenibuli.
113. * Cephalopholis kendalli Evermann and Seale; * Tenibuli.
114. * Cephalopholis leopardus (Lacépède); * Auki; * Tenibuli; * Ugii.
115. Cephalopholis miniatus Forksål; Shortland Island.
116. * Cephalopholis pachycentron (Cuv. and Val.); * Tenibuli; Shortland Island.
117. * Cephalopholis rogaa (Forskål); * Tenibuli.
118. * Cephalopholis urodelus (Bl. and Schn.); * Tenibuli; "Solomon Islands."
119. * Epinephelus caeruleo-punctatus (Bloch); * Tenibuli; Shortland Island.
120. Epinephelus corallicola (Kuhl and Van Hass.); Shortland Island.
121. Epinephelus daemeli (Günther); Shortland Island.
122. Epinephelus maculatus (Bloch); Bougainville Island; Shortland Island.
123. * Epinephelus malabaricus (Bl. and Schn.); * Tenibuli.
124. * Epinephelus merra Bloch; * Hathorn Sound; "Solomons."
125. * Epinephelus ongus (Bloch); * Tenibuli.
126. Epinephelus undulosus (Quoy and Gaimard); Shortland Island.
127. Grammistes sexlineatus (Thunberg); Shortland Island.

Family Plesiopidae.

128. * Plesiops nigricans (Rüppell); * Tenibuli; Shortland Island.

Family Pseudochromidae.

129. Pseudochromis fuscus Müller and Troschel; Shortland Island.

Family Priacanthidae.

130. Priacanthus hamrur (Forskål; Shortland Island.

Family Pempheridae.

131. * Pempheris dispar Herre; * Tenibuli.

Family Lutianidae.

132. * Lutianus biguttatus (Cuv. and Val.); * Hathorn Sound.
133. * Lutianus bohar (Forskål); * Tenibuli; Shortland Island.
134. * Lutianus chrysotaenia (Bleeker); * Tenibuli.
135. * Lutianus fulviflamma (Forskål); Tenibuli; Shortland Island.
136. * Lutianus gibbus (Forskål); * Tenibuli; Shortland Island.
137. * Lutianus kasmira (Forskål); * Auki; * Tenibuli.
138. * Lutianus lineatus (Quoy and Gaimard); * Tenibuli.
139. * Lutianus malabaricus (Bl. and Schn.); * Tenibuli.
140. * Lutianus marginatus (Cuv. and Val.); * Kulambangra Island, fresh water; Shortland Island.
141. Lutianus monostigma (Cuv. and Val.); Shortland Island.
142. * Lutianus oligolepis (Bleeker); * Tenibuli.
143. * Lutianus rivulatus (Cuv. and Val.); * Tenibuli.
144. * Lutianus russelli (Bleeker); * Kulambangra Island, in fresh water.
145. * Lutianus semicinctus (Quoy and Gaimard); * Tenibuli; * Ugii—; Shortland Island.
146. Macolor macolor (Lesson); * Tenibuli.
147. * Caesio caerulaureus Lacépède; * Tenibuli; Shortland Island.
148. * Caesio chrysozona Kuhl and Van Hass.; * Tenibuli.
149. * Caesio erythrogaster (Kuhl and Van Hass.); * Tenibuli.
150. Caesio lunaris Cuv. and Val.; Shortland Island.
151. Caesio teres Seale; Shortland Island.

Family Pomadasidae.

152. * Plectorhinchus celebicus Bleeker; * Tenibuli.
153. Plectorhinchus diagramma (Linnaeus).
154. * Scolopsis ciliatus (Lacépède); * Tenibuli.

155. Scolopsis bilineatus (Bloch); Shortland Island.
156. * Scolopsis leucotaenia Bleeker; * Hathorn Sound; * Tenibuli.
157. * Scolopsis margaritifer Cuv. and Val.; * Hathorn Sound.
158. Scolopsis temporalis (Cuv. and Val.); Shortland Island.

Family Theraponidae.

159. * Therapon cancellatus (Cuv. and Val.); * Auki, fresh water.
160. Therapon jarbua (Forskål); Shortland Island.

Family Sparidae.

161. * Sparus berda (Forskål); * Kulambangra Island, in fresh water.
162. * Lethrinus haematopterus Bleeker; * Tenibuli.
163. * Lethrinus harak (Forskål); *Tenibuli; Shortland Island.
164. * Lethrinus hypselopterus Bleeker; * Tenibuli.
165. * Gnathodentex oculo-maculatus Herre; * Tenibuli.
166. * Pentapus caninus (Cuv. and Val.); * Tenibuli.
167. Pentapus trivittatus (Bloch); Shortland Island.
168. * Monotaxis grandoculis (Forskål); * Tenibuli; * Hathorn Sound; Shortland Island.

Family Kyphosidae.

169. * Kyphosus cinerascens (Forskål); * Tenibuli; Shortland Island.
170. Kyphosus lembus (Cuv. and Val.); Shortland Island.

Family Gerridae.

171. Gerres argyreus (Bloch and Schneider); Shortland Island.

Family Mullidae.

172. * Upeneoides tragula (Richardson); * Tulagi.
173. Upeneus bifasciatus (Lacépède).
174. * Upeneus barbarinus (Lacépède); * Hathorn Sound; Shortland Island.
175. * Upeneus moana Jordan and Seale; * Tenibuli.
176. Upeneus chryseredros (Lacépède).
177. * Mulloides samoensis (Günther); * Tenibuli; Shortland Island.
178. Mulloides vanicolensis (Cuv. and Val.).

Family Sillaginidae.

179. Sillago sihama (Forskål); Bougainville Island.

Family Cirrhitidae.

180. Paracirrhites arcatus (Cuv. and Val.).

Family Platacidae.

181. Platax orbicularis (Foraskål); Shortland Island.

Family Toxotidae.

182. Toxotes jaculator (Pallas); Shortland Island.

Family Chaetodontidae.

183. Chaetodon auriga Forskål.
184. * Chaetodon bennetti Cuv. and Val.; * Hathorn Sound.
185. Chaetodon citrinellus Cuv. and Val.; Shortland Island.
186. Chaetodon ephippium Cuv. and Val.; Bougainville Island.
187. * Chaetodon fasciatus (Forskål); * Hathorn Sound; * Tenibuli.
188. Chaetodon kleinii Bloch.
189. Chaetodon lineolatus Cuv. and Val.; Shortland Island.
190. Chaetodon melanotus Bloch and Schn.; Bougainville Island.
191. * Chaetodon octofasciatus Bloch; * Tenibuli; Bougainville Island.
192. * Chaetodon rafflesi Bennett; * Tenibuli; * Ugii.
193. Chaetodon semeion Bleeker; Shortland Island.
194. * Chaetodon triangulum Kuhl and Van Hass.; * Tenibuli; Bougainville Island.
195. * Chaetodon trifasciatus Park; * Tenibuli; * Ugii; Howla Island; Shortland Island.
196. * Chaetodon vagabundus Linnaeus; * Tenibuli; Shortland Island.
197. Holacanthus bicolor (Bloch).
198. * Holacanthus sexstriatus (Kuhl and Van Hass.); * Tenibuli.
199. * Holacanthus vroliki Bleeker; * Tenibuli.

Family Zanclidae

200. Zanclus cornutus (Linnaeus).

Family Acanthuridae.

201. Acanthurus celebicus Bleeker.
202. * Acanthurus gahm (Forskål); * Tenibuli.
203. * Acanthurus lineatus (Linnaeus); * Tenibuli.
204. * Acanthurus leucosternon (Bennett).
205. * Acanthurus matoides Cuv. and Val.; * Tenibuli.
206. * Ctenochaetus strigosus (Bennett); *Tenibuli; Shortland Island.
207. * Zebrasoma flavescens (Bennett); * Hathorn Sound.
208. * Zebrasoma veliferum (Bloch); * Tenibuli.
209. Naso brevirostris (Cuv. and Val.); * Tenibuli.

Family Siganidae.

210. * Teuthis doliata (Cuv.); * Auki; * Tenibuli.
211. * Teuthis hexagonatus Bleeker; * Tenibuli.
212. * Teuthis lineata (Cuv. and Val.); * Tenibuli; Shortland Island.
213. * Teuthis oramin (Bl. and Schn.); * Tenibuli.
214. * Teuthis puella (Schlegel); * Tenibuli; Shortland Island.
215. * Teuthis rostrata (Cuv. and Val.); * Tenibuli; Shortland Island.
216. Teuthis striolata Günther.
217. Teuthis vermiculata (Cuv. and Val.); Shortland Island.
218. * Lo vulpinus (Schlegel); * Tenibuli; Shortland Island.

Family Scorpaenidae.

219. Scorpaenodes guamensis (Quoy and Gaimard); Bougainville Island; Shortland Island.

220. * Pterois antennata (Bloch) ; * Tenibuli.
221. Synanceia verrucosa Bl. and Schn.

Family Cephalacanthidae.

222. Dactyloptena orientalis (Cuv. and Val.).

Family Pomacentridae.

223. Amphiprion bicinctus Rüppell.
224. Amphiprion melanopus Bleeker.
225. * Amphiprion percula (Lacépède) ; * Tenibuli ; * Hathorn Sound.
226. Dascyllus aruanus (Linnaeus) ; Shortland Island.
344. Dascyllus melanurus Bleeker; Shortland Island.
227. * Acanthochromis polyacanthus (Bleeker) ; * Auki ; * Tenibuli; Shortland Island.
228. * Chromis caeruleus (Cuv. and Val.) ; * Auki ; * Tenibuli ; * Ugii ; Howla Island ; Shortland Island.
229. * Chromis ternatensis (Bleeker) ; * Tenibuli ; Shortland Island.
230. Cheiloprion labiatus (Day) ; * Ugii Island.
231. * Pomacentrus amboinensis Bleeker ; * Hathorn Sound ; * Tenibuli.
232. * Pomacentrus caeruleus Quoy and Gaimard ; * Hathorn Sound.
233. * Pomacentrus cranei Herre ; * Hathorn Sound ; * Tenibuli.
234. * Pomacentrus dorsalis Gill ; * Tenibuli ; * Ugii.
235. * Pomacentrus lividus (Forster) ; *Kulambangra Island, in fresh water ; * Tenibuli ; * Ugii ; Shortland Island.
236. * Pomacentrus melanopterus Bleeker ; * Hathorn Sound ; * Tenibuli.
237. * Pomacentrus moluccensis Bleeker ; *Tenibuli.
238. * Pomacentrus nigricans (Lacépède) ; * Ugii ; Shortland Island.
239. * Pomacentrus notophthalmus Bleeker ; * Hathorn Sound ; * Tenibuli.
240. * Pomacentrus pavo (Bloch) ; * Auki ; * Hathorn Sound ; * Tenibuli ; Shortland Island.
241. * Pomacentrus simsiang Bleeker ; *Tenibuli ; * Ugii.
242. * Pomacentrus tripunctatus (Cuv. and Val.) ; * Auki ; * Hathorn Sound ; * Tenibuli.
243. * Abudefduf bankieri (Richardson) ; * Tenibuli.
244. Abudefduf amabilis (De Vis) ; Shortland Island.
245. Abudefduf assimilis (Günther).
246. * Abudefduf bengalensis (Bloch) ; * Tenibuli.
247. * Abudefduf coelestinus (Cuv. and Val.) ; * Tenibuli ; Shortland Island.
248. * Abudefduf curacao (Bloch) ; * Tenibuli ; * Ugii ; Shortland Island.
249. * Abudefduf dickii (Liénard) ; * Tenibuli.
250. * Abudefduf lacrymatus (Quoy and Gaimard) ; * Tenibuli ; * Ugii.
251. * Abudefduf melas (Cuv. and Val.) ; * Tenibuli.
252. * Abudefduf metallicus Jordan and Seale ; * Kulambangra, fresh water ; * Auki, fresh water ; * Tenibuli.
253. * Abudefduf saxatilis (Linnaeus) ; * Tulagi ; Shortland Island.
254. Abudefduf septemfasciatus (Cuv. and Val.) ; Shortland Island.
255. * Abudefduf uniocellatus (Quoy and Gaimard) ; * Hathorn Sound ; * Ugii.
256. * Hemiglyphidodon plagiometopon (Bleeker) ; * Tenibuli.

Family Labridae

257. * Choerodon anchorago (Bloch) ; * Tenibuli ; shrortland Island.
258. * Epibulus insidiator (Pallas) ; * Tenibuli.
259. * Labrichthys cyanotaeina Bleeker ; * Tenibuli
260. Stethojulis axillaris (Quoy and Gaimard).
261. Stethojulis phaekadopleura (Bleeker).
262. Hemigymnus melapterus (Bloch) ; Shortland Island.
263. Halichoeres centiquadrus (Lacépède) ; Shortland Island.
264. * Halichoeres gymnocephalus (Bl. and Schn.) ; * Tenibuli ; Shortland Island.
265. Halichoeres opercularis Günther.
266. * Halichoeres purpurascens (Bl. and Schn.) ; * Tenibuli.
267. Halichoeres trimaculatus (Quoy and Gaimard) ; Shortland Island.
268. * Platyglossus hoeveni (Bleeker) ; * Tenibuli.
269. * Platyglossus scapularis (Bennett) ; * Tenibuli.
270. Macropharyngodon meleagris (Cuv. and Val.) ; Shortland Island.
271. Coris aygula (Lacépède).
272. Coris multicolor (Rüppell).
273. *Thalassoma cranei Herre ; *Auki ; *Tenibuli.
274. Thalassoma aneitensis Günther.
275. Thalassoma guntheri (Bleeker).
276. * Thalassoma hardwicke (Bennett) ; *Tenibuli ; Shortland Island.
277. Thalassoma janseni (Bleeker).
278. * Thalassoma lunare (Linnaeus) ; * Hathorn Sound ; Shortland Island.
279. * Thalassoma schwanenfeldi Bleeker ; * Ugii.
280. Thalassoma trilobata (Lacépède).
281. Cheilinus chlorurus Bloch ; Shortland Island.
282. Cheilinus diagrammus (Lacépède) ; Shortland Island.
283. * Cheilinus fasciatus (Bloch) ; * Tenibuli ; Shortland Island.
284. * Cheilinus oxyrhynchus Bleeker ; * Tenibuli.
285. Iniistius aneitensis (Günther).

Family Scaridae

286. * Callyodon abacurus (Jordan and Seale) ; * Tenibuli.
287. * Callyodon balinensis (Bleeker) ; * Tenibuli ; Shortland Island.
288. Callyodon cyanognathos (Bleeker) ; Shortland.
289. * Callyodon dimidiatus (Bleeker) ; * Hathorn Sound ; Shortland Island.
290. * Callyodon dubius (Bennett) ; * Tenibuli ; Shortland Island.

291. * Calloyodon erythrodon (Cuv. and Val.); * Tenibuli; Shortland Island.
292. * Callyodon frenatus (Bleeker); * Tenibuli.
293. Callyodon muricatus (Cuv. and Val.).
294. Callyodon mutabilis Gray; Shortland Island.
295. * Callyodon pectoralis (Cuv. and Val.); * Hathorn Sound; * Tenibuli.
296. * Callyodon quoyi (Cuv. and Val.); * Hathorn Sound; * Tenibuli; Shortland Island.
297. Callyodon rubroviolaceus (Bleeker); Shortland Island.
298. * Callyodon zonularis Jordan and Seale; * Tenibuli; Shortland * Is.

Family Rhyacichthyidae

299. Rhyacichthys aspro (Cuv. and Val.).

Family Echeneidae

300. Echeneis naucrates Linnaeus; Bougainville Island.

Family Eleotridae

301. Eleotris fusca (Bl. and Schn.); fresh water.
302. * Eleotris melanosoma Bleeker; * Auki, in fresh water.
303. Ophiocara aporos (Bleeker); in fresh water.
304. Ophiocara porocephalus Bleeker; in fresh water.
305. * Butis amboinensis (Bleeker); * Auki, in fresh water; * Kulambangra, in fresh water; * Ugii, fresh water.
306. Valenciennea violifera Jordan and Seale; Bougainville Island.

Family Gobiidae

307. * Bathygobius fuscus (Rüppell); * Kulambangra, in fresh water.
308. Gobius ornatus Rüppell; Shortland Island.
309. * Gnatholepis puntangoides (Bleeker); * Hathorn Sound; * Kulambangra Island, in fresh water.
310. Callogobius sclateri (Steindachner).
311. * Macgregorella santa Herre; * Tenibuli.
312. * Rhinogobius aterrimus Herre; * Kulambangra, in fresh water.
313. * Rhinogobius filamentosus (Sauvage); * Auki, in fresh water.
314. Gobiodon citrinus (Rüppell).
315. Gobiodon rivulatus (Rüppell); Howla Island.
316. Paragobiodon echinocephalus (Rüppell); Bougainville Island; Shortland Island.
317. Chonophorus crassilabris (Günther); Shortland Island.
318. * Amblygobius insignis Seale; *Hathorn Sound.
319. * Amblygobius myersi Herre; * Hathorn Sound.
320. * Periophthalmus barbarus (Linnaeus); * Auki; Bougainville Island.

Family Callionymidae

321. Synchiropus lineolatus (Cuv. and Val.); Bougainville Island.

Family Parapercidae

322. Parapercis hexophthalma (Cuv. and Val.).
323. Parapercis xanthozona (Bleeker); Shortland Island.

Family Blennidae

324. * Petroscirtes kulambangrae Herre; * Kulambangra Island, in fresh water.
325. Salarias coronatus Günther.

Family Carapidae

326. Carapus homei (Richardson); Howla Island; Shortland Island.

Family Balistidae

327. Balistapus aculeatus (Linneaus).
328. * Balistapus undulatus (Park); *Tenibuli; * Ugii; Shortland Island.
329. Balistapus verrucosus (Linnaeus); Shortland Island.
330. Balistes chrysopterus Bl. and Schn.
331. Balistes flavimarginatus Rüppell; Shortland Island.
332. * Balistes viridescens Bl. and Schn.; * Hathorn Sound.
333. Odonus niger (Rüppell).

Family Monacanthidae

334. * Stephanolepis tomentosus (Linnaeus); * Tenibuli.
335. Cantherines pardalis (Rüppell).
336. * Amanses scopas (Cuvier); * Tenibuli.

Family Ostraciidae

337. Ostracion cornutus Linnaeus; Shortland Island.
338. Ostracion diaphanus Bl. and Schn.; Shortland Island.

Family Tetraodontidae

339. Tetraodon nigropunctatus Bl. and Schn.; Shortland Island.
340. Tetraodon immaculatus Bl. and Schn.; Shortland Island.

Family Antennariidae

341. Antennarius commersonii (Shaw); Shortland Island.
342. Antennarius hispidus (Bl. and Schn.); "Solomons."
343. Antennarius striatus (Shaw).

NOTE 344—Dascyllus melanurus Bleeker inserted afterward on page 8 makes 344 species.

A List of Fishes Collected at Moorea, One of the Society Islands, Being the First Record from this Island

By Albert W. Herre,
Stanford University, California.

Family Holocentridae.

1. Holocentrus diadema Lacépède.
2. Holocentrus rubellio Seale.
3. Holocentrus sammara (Forskål).
4. Myripristis intermedius Günther.
5. Myripristis microphthalmus Bleeker.
6. Myripristis mooreanus Herre.
7. Myripristis murdjan (Forskål).

Family Syngnathidae.

8. Microphis brachyurus (Bleeker); fresh water.

Family Carangidae.

9. Caranx ignobilis (Forskål).
10. Caranx melampygus Cuv. and Val.

Family Apogonidae.

11. Apogon frenatus Valenciennes.
12. Cheilodipterus macrodon (Lacépède).

Family Kuhliidae.

13. Kuhlia marginata (Cuv. and Val.); fresh water.

Family Serranidae.

14. Anthias moorensis Herre.

Family Lutianidae.

15. Lutianus marginatus (Cuv. and Val.).

Family Kyphosidae.

16. Kyphosus cinerascens (Forskål).

Family Mullidae.

17. Upeneus bifasciatus (Lacépède).
18. Upeneus moana (Jordan and Seale).

Family Chaetodontidae.

19. Forcipiger longirostris (Broussonet).
20. Chaetodon auriga Forskål.
21. Chaetodon citrinellus Cuv. and Val.
22. Chaetodon trifasciatus Park.
23. Chaetodon ulietensis Cuv. and Val.
24. Chaetodon vagabundus Linnaeus.

Family Acanthuridae.

25. Acanthurus aliala Lesson.
26. Zebrasoma flavescens (Bennett).
27. Ctenochaetus striatus (Quoy and Gaimard).
28. Ctenochaetus strigosus (Bennett).

Family Zanclidae.

29. Zanclus cornutus (Linnaeus).

Family Pomacentridae.

30. Dascyllus trimaculatus (Rüppell).
31. Chromis dimidiatus (Klunzinger).
32. Chromis iomelas Jordan and Seale.
33. Pomacentrus nigricans (Lacépède).
34. Abudefduf coelestinus (Cuv. and Val.).

Family Labridae.

35. Halichoeres centiquadrus (Lacépède).
36. Cheilinus chlorurus Bloch.

Family Scaridae.

37. Callyodon erythrodon (Cuv. and Val.).

Family Eleotridae.

38. Eleotris fusca (Bl. and Schn.); fresh water.
39. Eviota afelei Jordan and Seale.

Family Gobiidae.

40. Chonophorus genivittatus (Cuv. and Val.).; fresh water.
41. Papenua pugnans (Grant); fresh water.
42. Stiphodon elegans (Steindachner); fresh water.

Family Carapidae.

43. Carapus homei (Richardson).
44. Carapus parvipinnis Kaup.
45. Encheliophis vermicularis Müller.

Family Balistidae.

46. Balistes bursa Bloch and Schneider.
47. Balistes vidua (Solander) Richardson.
48. Balistapus undulatus (Park).

Family Canthigasteridae.

49. Canthigaster margaritatus (Rüppell).

A Check List of the Fishes Recorded from the New Hebrides

By Albert W. Herre
Stanford University, California.

The appended list includes the author's collections in 1929, of 140 species, together with all the published records available. Beginning with Forster, who collected at Tanna, many collectors have visited the New Hebrides, but there has never been any intensive collecting at one locality so that only a small part of the fish fauna of the archipelago is known. It is to be hoped that ere long some one may devote a few months to making a careful study of the fishes of the New Hebrides by making extensive collections of the fresh-water fishes as well as those of the reefs and littoral regions, and also of the semipelagic species inhabiting the open interisland channels.

(All species collected by the author are marked by a *.)

Family Galeorhinidae

1. Triaenodon obesus (Rüppell)

Family Dasyatidae

2. Pteroplatea poecilura (Shaw).

Family Myliobatidae

3. Aetobatus narinari (Euphrasen).

Family Megalopidae

4. * Megalops cyprinoides (Broussonet); in fresh water.

Family Albulidae

5. * Albula vulpes (Linnaeus).

Family Chanidae

6. * Chanos chanos (Forskål).

Family Clupeidae

7. * Stolephorus delicatulus (Bennett).
8. * Harengula melanura (Cuv.).
9. * Harengula moluccensis (Cuv.).
10. Harengula kunzei (Bleeker).

Family Engraulidae

11. Engraulis setirostris (Broussonet).
12. Engraulis tri Bleeker.

Family Anguillidae

13. Anguilla mauritiana Bennett.

Family Ophichthyidae

14. Callechelys marmoratus (Bleeker).

Family Moringuidae

15. * Aphthalmichthys javanicus Kaup.

Family Muraenidae

16. * Echidna nebulosa (Ahl).
17. Echidna polyzona (Richardson).
18. Pseudechidna brummeri (Bleeker).
19. Gymnothorax favagineus (Bl. and Schn.).
20. Gymnothorax flavomarginatus (Rüppell).
21. Gymnothorax pictus (Ahl).
22. Gymnothorax thyrsoideus (Richardson).
23. Gymnothorax undulatus (Lacépède).
24. * Uropterygius concolor Rüppell.
25. * Uropterygius marmoratus (Lacépède).

Family Synodontidae

26. Trachinocephalus myops (Bl. and Schn.).

Family Belonidae

27. Belone platyura Bennett.

Family Hemiramphidae.

28. Hemiramphus affinis Günther.
29. Hemiramphus brasiliensis (Linnaeus).

Family Exocoetidae.

30. * Exocoetus volitans Linnaeus.
31. * Cypselurus altipennis (Cuv. and Val.).
32. Cypselurus naresi (Günther).
33. Cypselurus ogilbyi Jordan and Snyder.

Family Pleuronectidae.

34. Platophrys mancus (Broussonet).
35. Paraplagusia bilineata.

Family Soleidae

36. Pardachirus pavoninus (Lacépède).

Family Anomalopidae.

37. Anomalops katopron (Bleeker).

Family Holocentridae.

38. Holocentrus diadema Lacépède.
39. Holocentrus erythraeus Günther.
40. Holocentrus laevis Günther.
41. * Holocentrus microstomus Günther.
42. Holocentrus punctatissimus Cuv. and Val.
43. * Holocentrus ruber (Forskål).
44. * Holocentrus tiereoides Bleeker.
45. Holocentrus sammara (Forskål).
46. Holocentrus spinifer (Forskål).
47. * Myripristis murdjan (Forskål).
48. * Myripristis violaceus (Bleeker).

Family Syngnathidae

49. * Choeroichthys sculptus (Günther).
50. Microphis brachyurus Bleeker.
51. Syngnathus modestus Günther.
52. * Corythoichthys conspicillatus (Jenyns).
53. * Corythoichthys corrugatus Weber.
54. Hippocampus kuda Bleeker.

Family Centriscidae

55. Centriscus strigatus (Günther).

Family Atherinidae

56. * Atherina forskali Rüppell.
57. * Atherina endrachtensis (Quoy and Gaimard).
58. * Hepsetia lacunosa (Bl. and Schn.).
59. Hepsetia pinguis (Lacépède).

Family Mugilidae.

60. Mugil crenilabris Forskål.
61. Mugil cephalus Linnaeus.
62. * Mugil longimanus Günther.
63. * Liza troscheli (Bleeker).
64. * Liza vaigiensis (Quoy and Gaimard).
65. Cestraeus plicatilus Cuv. and Val.; fresh water.

Family Sphyraenidae

66. Sphyraena obtusata Cuv. and Val.

Family Polynemidae.

67. * Polynemus plebeius (Bonnaterre).

Family Carangidae

68. * Scomberoides toloo parah (Rüppell).
69. Naucrates ductor (Linnaeus):
70. * Megalaspis cordyla (Linnaeus).
71. Trachurus trachurus (Linnaeus).
72. * Trachurops macrophthalmus (Rüppell).
73. * Caranx ignobilis (Forskål).
74. Caranx forsteri Cuv. and Val.
75. Caranx melampygus Cuv. and Val.
76. * Caranx sexfasciatus Quoy and Gaimard; in fresh water.
77. * Caranx stellatus Eydoux and Souleyet.
78. * Gnathanodon speciosus (Forskål).
79. * Trachinotus baillonii (Lacépède).
80. Tranchinotus ovatus (Linnaeus).

Family Leiognathidae

81. * Leiognathus fasciatus (Lacépède).
82. Gazza minuta (Bloch).

Family Apogonidae.

83. * Apogon bandanensis Bleeker.
84. * Apogon frenatus Valenciennes.
85. * Apogon novemfasciatus Cuv. and Val.
86. * Apogon robusta Smith and Radcliffe.
87. Apogon sangiensis Bleeker.
88. Archamia lineolata (Cuv. and Val.).
89. Cheilodipterus macrodon (Lacépède).
90. Cheilodipterus quinquelineatus Cuv. and Val.

Family Ambassidae

91. * Priopis buruensis (Bleeker).

Family Kuhliidae.

92. * Kuhlia marginata (Cuv. and Val.); fresh water.
93. * Kuhlia taeniura (Cuv. and Val.).
94. * Kuhlia rupestris (Lacépède); fresh water.

Family Serranidae

95. Plectropomus maculatus (Bloch).
96. Variola louti (Forskål).
97. * Cephalopholis argus (Bl. and Schn.).
98. * Cephalopholis urodelus (Bl. and Schn.).
99. * Epinephelus merra Bloch.
100. * Epinephelus caeruleo-punctatus (Bloch).
101. Epinephelus maculatus (Bloch).
102. Epinephelus corallicola (Kuhl and Van Hass.).
103. * Grammistes sexlineatus (Thunberg).

Family Plesiopidae

104. * Plesiops melas Bleeker.
105. * Plesiops nigricans (Rüppell).

Family Lutianidae

106. * Lutianus fulviflamma (Forskål).
107. Lutianus gibbus (Forskål).
108. Lutianus kasmira (Forskål).
109. * Lutianus marginatus (Cuv. and Val.).
110. * Lutianus monostigma (Cuv. and Val.).
111. * Lutianus semicinctus (Quoy and Gaimard).
112. Caesio caerulaureus Lacépède.

Family Pomadasidae

113. Pomadasis grunniens (Bl. and Schn.).
114. * Scolopsis bilineatus (Bloch).
115. Scolopsis cancellatus (Cuv. and Val.).
116. Scolopsis monogramma (Kuhl and Van Hass.).

Family Theraponidae

117. * Therapon jarbua (Forskål).
118. Therapon argenteus (Cuv. and Val.).

Family Lethrinidae

119. * Lethrinus harak (Forskål).
120. Lethrinus ramak (Forskål).
121. Gnathodentex aureo-lineatus (Lacépède).

Family Kyphosidae

122. Kyphosus lembus (Cuv. and Val.).

Family Gerridae

123. Gerres argyreus (Bl. and Schn.)
124. * Gerres filamentosus Cuvier.

Family Mullidae

125. * Upeneus sulphureus (C. and V.).
126. * Upeneus moana Jordan and Searle.
127. Upeneus porphyreus Jenkins.
128. * Mulloides samoensis Günther.

Family Monodactylidae

129. * Monodactylus argenteus (Linnaeus); fresh water.

Family Scatophagidae

130. * Scatophagus argus (Linnaeus); in fresh water.

Family Chaetodontidae

131. Chaetodon auriga (Forskål).
132. Chaetodon citrinellus Cuv. and Val.
133. Chaetodon ephippium Cuv. and Val.
134. * Chaetodon fasciatus (Forskål).
135. Chaetodon flavirostris Günther.
136. Chaetodon lineolatus (Cuv. and Val.).
137. Chaetodon mertensi Cuv. and Val.
138. Chaetodon pelewensis Kner.
139. * Chaetodon triangulum Kuhl and Van Hass.
140. * Chaetodon trifasciatus Park.
141. * Chaetodon unimaculatus Bloch.
142. Chaetodon vagabundus Linnaeus.
143. Heniochus acuminatus (Linnaeus).

144. * Heniochus permatatus Cuv. and Val.
145. Holacanthus bispinosus Günther.
146. Holacanthus cyanotis Günther.
147. Holacanthus flavissimus Cuv. and Val.
148. * Holacanthus nicobariensis (Bl. and Schn.).
149. * Holacanthus semicirculatus Lesson.
150. Holacanthus tibicen Cuv. and Val.

Family Zanclidae

151. Zanclus cornutus (Linnaeus).

Family Acanthuridae

152. * Acanthurus elongatus (Lacépède).
153. * Acanthurus flavoguttatus Kittlitz.
154. Acanthurus guttatus Bloch and Schneider.
155. * Acanthurus lineatus (Linnaeus).
156. Acanthurus leucopareius (Jenkins).
157. * Acanthurus triostegus (Linnaeus).
158. * Ctenochaetus strigosus (Bennett).
159. * Zebrasoma flavescens (Bennett).
160. Naso brevirostris (Cuv. and Val.).
161. Naso annulatus (Quoy and Gaimard).
162. * Naso lituratus (Bl. and Schn.).
163. Naso tuberosus Lacépède.
164. Naso unicornis (Forskål).
165. Naso vlamingi (Cuv. and Val.).

Family Siganidae

166. Teuthis doliata (Cuvier).
167. Teuthis lineata (Cuv. and Val.).
168. Teuthis marmorata (Quoy and Gaimard).
169. Teuthis rostrata (Cuv. and Val.)
170. Teuthis striolata Günther.

Family Scorpaenidae

171. Sebastapistes bynoensis (Richardson).
172. * Scorpaenodes guamensis (Quoy and Gaimard).
173. * Scorpaenodes scabra (Ramsay and Ogilby).
174. Pterois volitans (Linnaeus).
175. Pterois miles (Bennett).
176. Centropogon australis (Shaw).
177. Pelor didactylum (Pallas).

Family Pomacentridae

178. Dascyllus aruanus (Linnaeus).
179. Dascyllus marginatus (Rüppell).
180. Dascyllus trimaculatus (Rüppell).
181. * Acanthochromis polyacanthus (Bleeker).
182. * Chromis caeruleus (Cuv. and Val.).
183. * Chromis dimidiatus (Klunzinger).
184. * Chromis ternatensis (Bleeker).
185. * Cheiloprion labiatus (Day).
186. * Pomacentrus amboinensis Bleeker.
187. * Pomacentrus albofasciatus Schlegel and Muller.
188. * Pomacentrus littoralis (Kuhl and Van Hass.).
189. * Pomacentrus lividus (Forster).
190. * Pomacentrus nigricans (Lacépède).
191. * Pomacentrus notophthalmus Bleeker.
192. * Pomacentrus pavo (Bloch).
193. Pomacentrus taeniurus Bleeker.
194. Pomacentrus tripunctatus Cuv. and Val.
195. * Pomacentrus tropicus Seale.
196. * Pomacentrus violascens Bleeker.
197. Abudefduf amabilis (De Vis).
198. * Abudefduf brownriggi (Bennett).
199. Abdefduf coelestinus (Cuv. and Val).
200. Abudefduf glaucus (Cuv. and Val.).
201. * Abudefduf leucozona (Bleeker).
202. Abudefduf melas (Cuv. and Val.).
203. * Abudefduf saxatilis (Linnaeus).
204. * Abudefduf sordidus (Forskål).
205. * Abudefduf taupo Jordan and Seale.
206. * Abudefduf uniocellatus (Quoy and Gaimard).

Family Nesiotidae

207. * Nesiotes purpurascens (De Vis); * Vila, Efate Island.

Family Labridae

208. Lepidaplois atrolumbus Günther.
209. Lepidaplois axillaris (Bennett).
210. * Epibulus insidiator (Pallas).
211. Duymaeria caeruleomaculata Günther.
212. Labroides dimidiatus (Cuv. and Val.).
213. Stethojulis axillaris (Quoy and Gaimard).
214. * Hemigymnus melapterus (Bloch).
215. Halichoeres centiquadrus (Lacépède).
216. * Halichoeres miniatus (Cuv. and Val.).
217. Halichoeres trimaculatus (Quoy and Gaimard).
218. * Platyglossus notopsis (Cuv. and Val.).
219. Coris aygula (Lacépède).
220. Coris cuvieri (Bennett).
221. Coris multicolor (Rüppell).
222. Coris pulcherrima Günther.
223. Hologymnosus semidiscus (Lacépède).
224. * Thalassoma hardwicke (Bennett).
225. Thalassoma lunare (Linnaeus).
226. Thalassoma janseni (Bleeker).
227. Thalassoma purpureum (Forskål).
228. Thalassoma trilobata (Lacépède).
229. Thalassoma umbrostigma (Rüppell).
230. Thalassoma aneitensis (Günther).
231. Gomphosus varius Lacépède.
232. Cheilinus ceramensis Bleeker.
233. * Cheilinus chlorurus Bloch.
234. * Cheilinus diagrammus (Lacépède).
235. Cheilinus fasciatus (Bloch).
236. Cheilinus trilobatus Lacépède.
237. Cheilinus undulatus Rüppell.
238. Novaculichthys taeniourus (Lacépède).
239. Iniistius aneitensis (Günther).

Family Scaridae

240. Leptoscarus moluccensis (Bleeker).
241. Callyodon balinensis (Bleeker).
242. Callyodon celebicus (Bleeker).
243. Callyodon bataviensis (Bleeker).
244. Callyodon blochii (Cuv. and Val.).
245. * Callyodon erythrodon (Cuv. and Val.).
246. Callyodon fasciatus (Cuv. and Val.).
247. Callyodon dussumieri (Cuv. and Val.).
248. Callyodon macrocheilos (Bleeker).

Family Echeneidae

249. Echeneis remora Linnaeus.
250. Echeneis naucrates Linnaeus.

Family Eleotridae

251. * Asterropteryx semipunctatus Rüppell.
252. * Eleotris fusca (Bl. and Schn.); in fresh water.
253. * Eleotris melanosoma Bleeker; in fresh water.
254. * Ophiocara porocephalus Bleeker; in fresh water.

255. Ophiocara aporos (Bleeker).
256. * Eviota smaragdus Jordan and Seale.
257. * Eviota viridis (Waite).
258. * Encaeura evides Jordan and Hubbs.
259. Valenciennea strigata (Broussonet).
260. Valenciennea violifera Jordan and Seale.

Family Gobiidae

261. * Bathygobius fuscus (Rüppell).
262. * Gobius ornatus Rüppell.
263. * Gnatholepis corlettei Herre; * Bushman's Bay, Malekula.
264. * Gnatholepis gemmeus Herre.
265. Callogobius hasseltii (Bleeker).
266. * Callogobius sclateri (Steindachner).
267. * Macgregorella santa Herre; * Hog Harbor, Espiritu Santo Island.
268. * Rhinogobius baliuroides (Bleeker).
268*a*. * Rhinogobius malekulae Herre; * Bushman's Bay, Malekula Island.
269. Rhinogobius criniger (Cuv. and Val.).
270. Gobiodon citrinus (Rüppell).
271. * Gobiodon quinquestrigatus (Cuv. and Val.).
272. * Gobiodon rivulatus (Ruppell).
273. Paragobiodon echinocephalus (Rüppell).
274. Chonophorus genivittatus (Cuv. and Val.); in fresh water.
275. Chonophorus crassilabris (Günther); in fresh water.
276. * Amblygobius phalaena (Cuv. and Val.).
277. * Zonogobius semidoliatus (Cuv. and Val.).
278. Sicyopterus taeniurus (Günther).
279. * Periophthalmus barbarus (Linnaeus).

Family Parapercidae

280. Parapercis cylindrica Bloch.
281. Parapercis hexophthalma (Cuv. and Val.).

Family Blenniidae

282. * Enneapterygius minutus (Günther).
283. * Enneapterygius punctulatus Herre.
284. Petroscirtes maroubrae (Ogilby).
285. Petroscirtes rhinorhynchos Bleeker.
286. Petroscirtes tapeinosoma Bleeker.
287. Cirripectes variolosus (Cuv. and Val.).
288. Salarias aneitense Günther.
289. Salarias beani Fowler.
290. Salarias belemnites De Vis.
291. * Salarias caudolineatus Günther.
292. * Salarias edentulus (Bl. and Schn.).
293. Salarias fasciatus (Bloch).
294. Salarias fuscus (Rüppell).
295. * Salarias guttatus Cuv. and Val.
296. Salarias irroratus Alleyne and Macleay.
297. Salarias lineatus Cuv. and Val.
298. Salarias marmoratus (Bennett).
299. * Salarias periophthalmus Cuv. and Val.
300. * Salarias saliens (Forster).
301. * Salarias walaensis Herre; * Wala Island.
302. * Enchelyurus ater (Günther).

Family Brotulidae

303. Brotula ensiformis Günther.

Family Balistidae

304. Balistapus aculeatus (Linnaeus).
305. Balistapus rectangulus (Bl. and Schn.).
306. * Balistapus undulatus (Park).
307. Balistes fuscus Bloch and Schn.
308. Balistes chrysopterus Bl. and Schn.
309. * Balistes viridescens Bl. and Schn.

Family Monacanthidae

310. Cantherines pardalis (Rüppell).
311. Cantherines sandwichiensis (Quoy and Gaimard).

Family Ostraciidae

312. Ostracion lentiginosum Bl. and Schn.
313. Ostracion sebae Bleeker.

Family Canthigasteridae

314. Canthigaster cinctus (Richardson).
315. Canthigaster striolatus (Quoy and Gaimard.

Family Tetraodontidae

316. Spheroides hypselogenion (Bleeker).
317. Spheroides hamiltoni (Richardson).
318. Tetraodon immaculatus Bloch and Schn.
319. Tetraodon hispidus Linnaeus.
320. Tetraodon nigropunctatus Bl. and Schn.
321. Tetraodon stellatus Bl. and Schn.

Laboratory of Agricultural Chemistry of the Chinese Eastern Railway

By N. I. MOROSOW
(Harbin, North Manchuria)

The work of the Laboratory (established in 1923) is connected with the Railway Land Department (Agricultural and Zootechnic Farms), Butter and Cheese Dairies, dry distillation of wood, etc. The Laboratory is making analyses and investigations of products manufactured and produced in the above-mentioned sections and estimation of these products according to their chemical composition.

The Experimental Stations of the Chinese Eastern Railway have to deal with experiments of different kinds of cereals, beans and other plants, their selection, the examination of their good standing

against insects, diseases, etc., and especially their nutritive value. The chemical and physical examination of soils, where the Experimental Stations are making their experiments, are investigated also. Forage plants and different fertilizers have to undergo tests and analyses in the Laboratory.

The Laboratory is also making analyses of different food products of animal origin such as milk, cheese, cheese curd, casein, etc., for private persons.

In the summer of 1925 the Laboratory started investigations of cereals exported from North Manchuria. These cereals being exported in large quantities, the Railway was in great need of getting a thorough knowledge concerning their precise estimation, the best conditions of their storage and changes in composition which takes place by the influence of different factors, such as moisture, temperature, etc. The principal objects of the investigation have been soya bean, soya bean oil, wheat, corn, sorghum (kaoliang).

The Laboratory pays its special attention to the investigation of soya bean as a chief article exported from North Manchuria, which of late became widely known all over the world. These investigations may be pointed out under the following classification:

1. Chemical composition of soya bean from different parts of North Manchuria.
2. Estimation of commercial qualities of soya bean (moisture content, impurities, etc.).
3. Investigation of different conditions of storage and transportation of the soya bean.
4. Physical and chemical properties of soya bean oil produced at different oil mills of North Manchuria.
5. Changes in composition and commercial qualities of soya bean oil caused by different conditions of storage and transportation.
6. Finding out new and simplified methods of estimation and qualification of soya bean oil.
7. Methods of refining soya bean oil by means of bleaching earths found in North Manchuria.
8. Chemical examination of soya bean cake.
9. Changes in its chemical composition caused by different conditions of storage and transportation.
10. Estimation of nutritive value of soya bean extraction meal and its uses for feeding purposes.
11. Estimation of nutritive value of soya bean flour.
12. Elaboration of the best method of drying soya bean for export.

The fundamental plan of the work that is being done in the Laboratory is to investigate cereals and soya bean and other agricultural products of North Manchuria. On the basis of many and extensive analyses and investigations of different crops taken for several years the Railway was enabled to fix certain standards in graduating soya bean of different commercial qualities for the standard samples. This kind of investigation was necessitated by the Mixed Storage System of transportation partly accepted in the Railway.

Some of these works have not been fully accomplished yet, but a larger part of them is already completed.

In this year the Staff of the Laboratory consists of: Director, 1; Chief Chemist, 1; Associate Chemists, 3; Micologist, 1; Assistants, 4.

In the course of the next few years the Laboratory is planning to completely organize the following Departments:

1. Analysis of agricultural and food products.
2. Research in local products of plant and animal origin.
3. Systematic investigation of soils, fertilizers and different minerals.
4. Plant diseases.

The Canal Zone Experimental Gardens

(In the Panama Star & Herald)

With the slow but constant increase in the development of agriculture in the Republic of Panama, there should be a considerable amount of interest in a little official publication of the Panama Canal called the "Annual Report of the Canal Zone Experiment Gardens."

The Experiment Gardens were established several years ago, and prior to that time practically nothing had been done in the matter of the scientific development of agriculture on the Isthmus. The gardens have been operated on a most modest scale and emphasis has been laid on the development of trees and vines, fruits and flowers, as well as the so-called economic plants. As to the relatively unimportant matter of plants and flowers, the situation was well summed up by Dr. Paul C. Standley, an eminent authority, who said, in speaking of flora of the Canal Zone: "There is probably no region of Central America which exhibits so mediocre a selection of horticultural or ornamental plants as does this part of Panama. Scarcely one garden plant of any special interest is seen about Panama City, all those planted being the most ordinary and widespread tropical ornamentals."

All that has been changed and the Experiment Gardens have provided hundreds of new varieties gathered from many remote parts of the world.

As an example of the work being done, reference may be made to the introduction, propagation and dissemination of the varieties of sugar cane. The report points out that the sugar industry in Panama is at present suffering much from the Mosaic disease and other pests, and that there is a need of varieties of cane resistant to this disease and also of higher sugar-yielding capacity.

To meet this need the gardens introduced many varieties of cane, including a number that have proved satisfactory in other countries. During the last year sample lots for testing under plantation conditions have been distributed without charge to cane growers in the Republic. New varieties are constantly being received and developed. The same work is being done with rice—great quantities of which are ever being imported into Panama.

While emphasis is placed on the development of those things which give most promise of producing economic results, the ornamental plants and trees are not being overlooked, and many new varieties, hitherto unknown to the Isthmus, are being constantly introduced and developed. Mention might also be made of the strides which have been made in the scientific development of the avocado, the mango, the pineapple, the banana and even the fig.

Just recently Governor Roosevelt, of Porto Rico, pointed out the great advantages which would result from the establishment by the government of the United States of extensive agricultural experiment stations in the tropics. Both the necessity and the advantages of such outlying stations cannot be overestimated.

It would seem to us that the valuable work which has been started at the Canal Zone Experiment Gardens at Summit is one which should be conducted under the wing of the United States Department of Agriculture. The cost of operating the gardens would not be great and in all probability the expenditure of a sum not greater than $75,000 a year would produce results of incalculable value to the agricultural interests of this part of the world and would be a service worth many times its cost in the good will engendered.